French Transportable Laser Ranging Station
Chronometry accuracy estimation

M.Pierron - D.Feraudy – M.Furia – F.Pierron – 0CA (Grasse)

FTLRS in Chania (Creta)
Gavdos campaign – 04 to10 2003 -

Towards zero bias…

laser maintenance

What conditions?

- Very short time intervals: (internal cal. < 30 ns)
- External calibration: (100 m to 300 m)
- For satellites tracking: (400 km to 10 000 km)
- Time evolution (long-lasting effect)

FTLRS in SanFernando (Spain)
June 2004

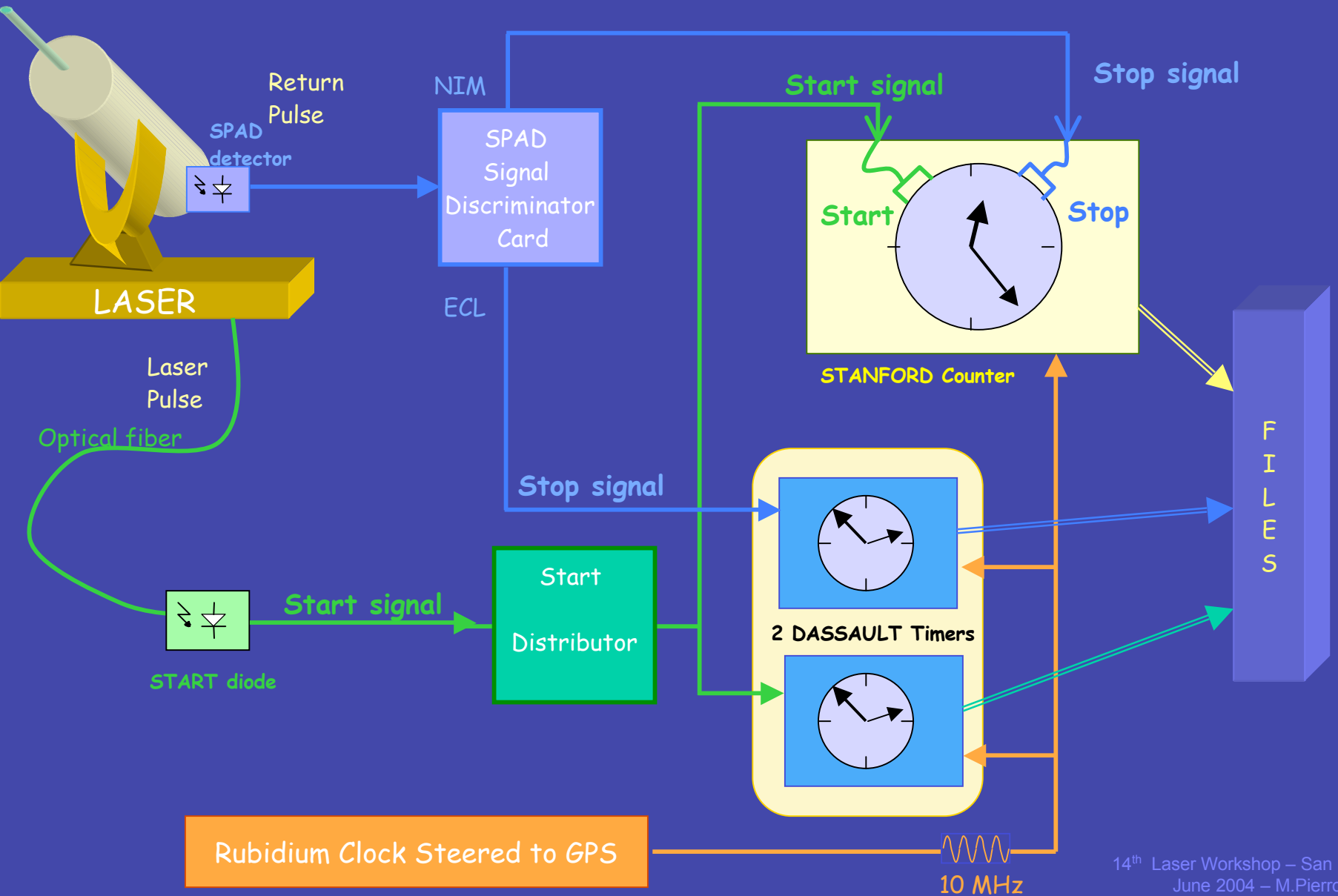
How?

With two timing systems:

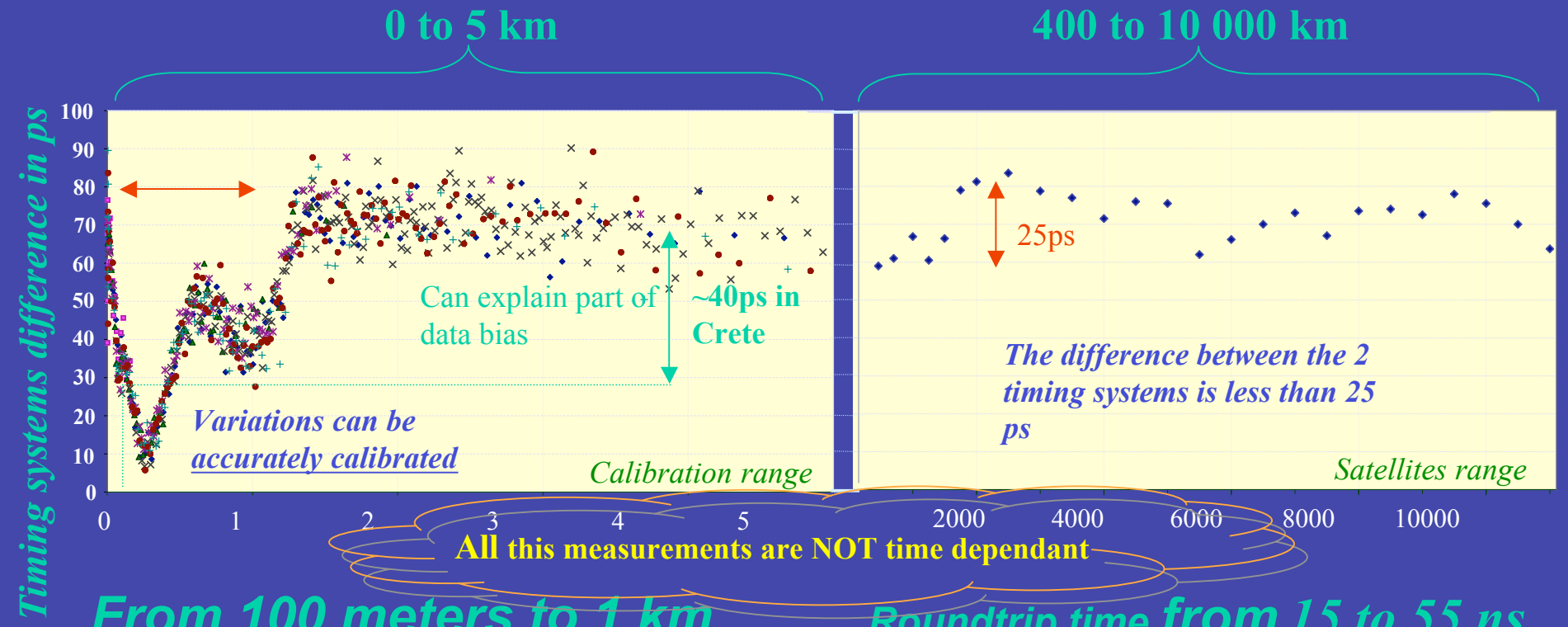
- FTLRS Stanford chronometer (**temperature controlled**)
- Dassault Timers as a reference

In same Context : Laser for start
Photodiode for stop
Without mutual perturbation

On same events : Echo or noise

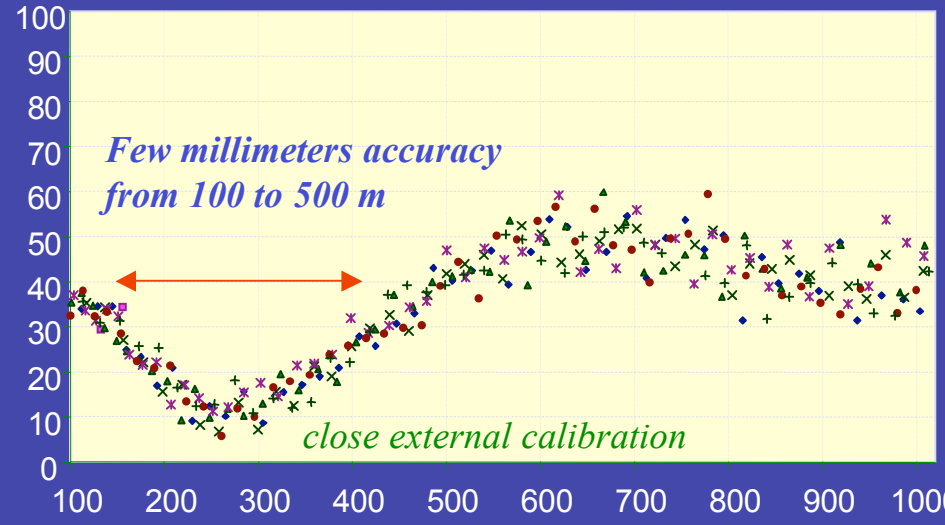


Measurement results

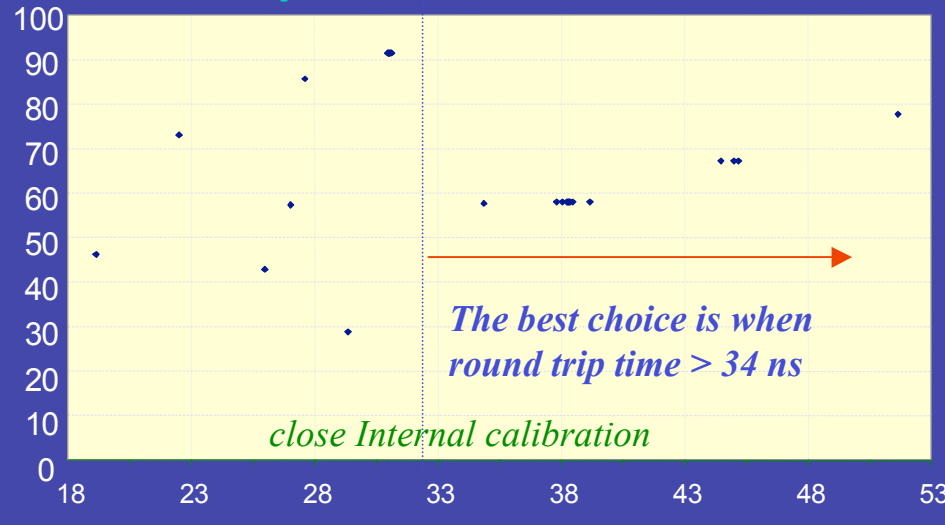


All this measurements are NOT time dependant

From 100 meters to 1 km



Roundtrip time from 15 to 55 ns



CONCLUSION

Very important to model the chronometry behavior at different ranges, and to processs the calibration value accordingly.

- Stanford Chronometer can achieve ***few milimeters accuracy during satellites tracking*** (from 400 to 10 000 km)**.**

- Range near external calibration is easy to model. ***The correction to achieve for this external calibration can be tuned to 30/60 picos depending on the target's range.***

- Values near internal calibration range are more difficult to evaluate, except when the roundtrip time is longer than 34 nanos. ***The difference between external and internal calibrations is about 50 picos (7.5 mm).***